Math 411 Introduction to Abstract Algebra I
Spring 2006

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This course gives an introduction to **Group Theory**. You will notice a striking difference between this course and other math courses you have taken so far. You will be introduced to many new definitions and concepts, most of them are rather abstract. When you learn them, pay particular attention to *concrete examples*. Memorizing definitions without being able to give examples simply won't work. There will be some computation, but mostly *proofs*. You will see them every class, you will read them in the textbook, you will write them in your homework. That is why it is *essential* that you complete **Math 300** (or equivalent) before you take this class.

You will be expected to attend every class. I encourage you to participate actively and ask questions. Work on the material outside class. Carefully read the textbook and lecture notes *before* coming to lecture. While reading use pencil and paper to work on examples and fill in omitted steps in proofs.

Grading Scale:

$87 \leq$ A$- < 90$	$90 \leq$ A≤ 100	
$77 \leq$ B$- < 80$	$80 \leq$ B< 83	$83 \leq$ B$+ < 87$
$67 \leq$ C$- < 70$	$70 \leq$ C< 73	$73 \leq$ C$+ < 77$
$0 \leq$ F< 60	$60 \leq$ D< 63	$63 \leq$ D$+ < 67$

Class schedule:

- Tue Thu 9:30–10:45 (11:15–12:30) in LGRT 117

Exams:

- Midterm 1: Wed March 15, 5:00–7:00 location TBA
- Midterm 2: Wed April 26, 5:00–7:00 location TBA
- Final exam: TBA

Grading:

Homework (30%) + Midterm 1 (20%) + Midterm 2 (20%) + Final (30%)
Homework is due every Tuesday at the **beginning** of class.
Late homework **will not** be accepted!

Text:

- *Algebra: Pure and Applied*, Aigli Papantonopoulou, Prentice-Hall, Inc. 2002.

Course outline

Background
- 0.3 - Properties of $\mathbb{Z}$
- 0.4 - Complex Numbers
- 0.5 - Matrices

Groups
- 1.1 - Examples and Basic Concepts
- 1.2 - Subgroups
- 1.3 - Cyclic Groups
- 1.4 - Permutations

Group Homomorphisms
- 0.1 - Sets and Maps
- 0.2 - Equivalence Relations and Partitions
- 2.1 - Cosets and Lagrange's Theorem
- 2.2 - Homomorphisms
- 2.3 - Normal Subgroups
- 2.4 - Quotient Groups
- 2.5 - Automorphisms

Direct Products and Abelian Groups
- 3.1 - Examples and Definitions
- 3.2 - Computing Orders
- 3.3 - Direct Sums
- 3.4 - Fundamental Theorem of Finite Abelian Groups

Group Actions
- 4.1 - Group Actions and Cayley's Theorem
- 4.2 - Stabilizers and Orbits in a Group Action
- 4.4 - Conjugacy Classes and the Class Equation
- 4.3 - Burnside's Theorem and Applications